Abstract—Entrepreneurship is an essential source of economic growth and a prominent factor influencing socio-economic development. Entrepreneurship education educates and enhances entrepreneurial activity. This study aims to understand current trends in entrepreneurship education and evaluate the effectiveness of diverse entrepreneurship education programs. An increasing number of universities offer entrepreneurship education courses to create and successfully continue entrepreneurial ventures. Despite the prevalence of entrepreneurship education, research studies lack inconsistency about the effectiveness of entrepreneurship education to promote and develop entrepreneurship. Strategies to develop entrepreneurial attitudes and intentions among individuals are hindered by a lack of understanding of entrepreneurs' educational purposes, components, methodology, and resources required. Lack of adequate entrepreneurship education has been linked with low self-efficacy and lack of entrepreneurial intent. Moreover, in the age of digitisation and during the COVID-19 pandemic, digital learning platforms (e.g., online entrepreneurship education courses and programs) and other digital tools (e.g., digital game-based entrepreneurship education) have become more relevant to entrepreneurship education. This paper contributes to the continued academic literature in entrepreneurship education by evaluating and assessing current trends in entrepreneurship education programs, leading to better understanding to reduce gaps between entrepreneurial development requirements and higher education institutions.

Keywords—Entrepreneurship education, digital technologies, academic entrepreneurship, COVID-19.

I. INTRODUCTION

THE role and importance of entrepreneurship have a significant impact on world economics. The entrepreneurial sector can serve as a platform for the social and economic advancement of the country. Entrepreneurship can be a potential solution to the difficulties such as economic recession and unemployment. Researchers predict that the entrepreneurial economy will be crucial to successful economies [1]. An increasingly significant factor regarding entrepreneurship is entrepreneurship education. In recent years, there has been an upsurge in research interest and publications in entrepreneurial education. Many research studies demonstrated the significant influence universities could have on entrepreneurial development [2], [3]. With time, traditional entrepreneurship education curriculums are evolving. Research on entrepreneurship education has been progressed remarkably in a short span of time. Despite that, there is a lack of consensus among scholars in this research field on several definitive issues and differences regarding course objectives, content, target audience, and teaching methods. Moreover, due to the digitisation and emergence of the COVID-19 pandemic, entrepreneurship education is evolving. This survey paper aims to understand the emerging trends, current research directions and inconsistencies to recognise prominent research gaps. It will inform researchers and educators about the current state of research and provide directions concerning future research trajectories on entrepreneurship education. Research discussions mentioned in this article will facilitate policymakers to assess and implement progressive and effective entrepreneurship educational programmes.

The remainder of the article is organised as follows. The second section introduces the research background, effectiveness and limitations on traditional entrepreneurship education. Section three describes the research methodology. The impact and interest regarding traditional trends and the use of digital technologies to support entrepreneurship education have been presented and discussed in section four. Section five outlines conclusions, challenges and directions for further research on entrepreneurship education.

II. RESEARCH BACKGROUND

A. Changing Paradigms in Entrepreneurial Education

The university system has seen a transformation from a teaching institution into one which combines teaching with research. Research studies suggest the importance of partnership among the university, government, and industry to improve innovation in a knowledge-based society [4]. As a result, universities are trying to perform long-term research activities and interact with industry [5]. Universities worldwide are becoming increasingly entrepreneurial by offering educational programs within the ecosystem of innovation and economic and social development [6]. Nevertheless, many issues remain clouded regarding university-to-industry knowledge transfer [7]. Scholars recognised that the purpose of the university sector should be to prepare graduates for both employment and self-employment [8]. However, research studies have questioned the potency of the university education system in providing the relevant skills required by industry [9], [10]. Recent studies investigated whether employment competencies of business school graduates meet employers' expectations [11], [12]. These studies highlighted that the
competence of business school graduates is far from the employers' expectations.

The field of entrepreneurship started in just a few pioneering colleges and universities, as the first entrepreneurship class was taught at Harvard Business School in 1945 [13]. Currently, more than 4,000 higher education institutions worldwide provide entrepreneurship programs [14]. According to a 2013 article, only in the U.S., nearly 400,000 students enrolled in 18 college entrepreneurship courses [15]. Over the last two decades, entrepreneurship curricula in higher education have changed significantly [16]. Entrepreneurs and global businesses actively promote entrepreneurship education to develop the entrepreneurial ecosystem [17]. World Economic Forum's Global Education Initiative (GEI) report identified the importance of entrepreneurship education to create jobs, generate economic growth and stimulate innovation to solve global obstacles [18]. Global Entrepreneurship Monitor 2020/2021 Global Report emphasised educating for entrepreneurship to address low self-efficacy and entrepreneurial intent in developed economies [19].

Despite the popularity of entrepreneurship education, researchers have raised questions and criticism about the effectiveness of entrepreneurship education to promote and develop entrepreneurship [20]. Scholars argued that the traditional entrepreneurship education system stultifies rather than develops the necessary attributes and abilities to produce entrepreneurs [21]. A key concern regarding entrepreneurship education irks many researchers is whether entrepreneurship education helps by providing the skills and tools required to start one's own business or entrepreneurs have some inherent characteristics that make them more inclined to entrepreneurship [22]. More on that argument, there are two effective approaches to entrepreneurship education programs. One is the skills-based approach, where entrepreneurial spirits are born. The other is an aptitude-based approach, where skills can be taught to anyone with entrepreneurial ambition. A systematic review consisting of 409 studies related to entrepreneurship education and entrepreneurship intention inferred a lack of inconsistent association between these two [23].

III. METHODOLOGY

This paper aims to demonstrate the current trends of entrepreneurship education, evaluate their effectiveness, and measure their interest over time to create a sustainable entrepreneurial ecosystem. The literature review strategy has originated from an interest in obtaining papers related to entrepreneurship education and digital learning. For the present study, we have searched the Dimensions.ai database [24], an inter-linked research information system provided by Digital Science [25]. We have preferred this system because of the vast amount of data it provides, including the number of citations per publication, and because of its unique feature of providing APIs (Application Programming Interface) to perform queries using a specific DSL (Domain Specific Language) [26]. Furthermore, a recent study has shown a strong correlation between Scopus and the Dimensions.ai database regarding citation counts, making the latter a plausible option for data collection and analysis [27].

We have searched the Dimensions.ai database with the following keywords separately:

1. entrepreneurship education
2. entrepreneurship education programs
3. digital learning entrepreneurship education
4. game-based entrepreneurship education

The parameters of the query are:

- Publication year range: 2007–2021
- Only publications of type "article" are used.

The query was performed on 18th October 2021. Table I shows the number of articles retrieved for each keyword during the 2007-2021 period.

<table>
<thead>
<tr>
<th>KEYWORD</th>
<th>Number of papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>entrepreneurship education</td>
<td>7686</td>
</tr>
<tr>
<td>entrepreneurship education programs</td>
<td>2636</td>
</tr>
<tr>
<td>digital learning entrepreneurship education</td>
<td>147</td>
</tr>
<tr>
<td>game-based entrepreneurship education</td>
<td>58</td>
</tr>
</tbody>
</table>

The extracted data have been further analysed with the aid of the MS Office application. The analysis and discussions were documented in section four of this article.

IV. TRENDS IN ENTREPRENEURSHIP EDUCATION

A. Entrepreneurship Education Programs

![Fig. 1 Number of papers published by year during the 2007-2021 period for the keyword "entrepreneurship education"](image_url)

Our search strategy yielded 7686 papers for the keyword "entrepreneurship education" during the 2007-2021 period. Fig. 1 depicts the number of articles published by year during the 2007-2021 period for the keyword "entrepreneurship education". According to Fig. 1, more than 1000 articles published each year since 2019 represent interest in entrepreneurship education have increased in recent years. Many universities are now providing entrepreneurship-related courses and programs [28]. With the transition of university education, many universities considered entrepreneurship a central curriculum rather than a business elective [29]. Recent studies have assessed and investigated the impact of
entrepreneurship education programs. Researchers showed the positive outcomes of an entrepreneurship training program on individuals without prior entrepreneurship opportunities [30]. A research study demonstrated that individuals who attended entrepreneurship education are more likely to establish firms than those who had not received an entrepreneurship education [31]. Another comparative study on U.S. and Korea showed significant differences between entrepreneurship education programs learners and those who did not study an entrepreneurship education course. Attending the entrepreneurship education course increased the intention of venture creation [32]. Similarly, students who participated in entrepreneurship courses at the university are positively associated with increased business intentions and improved perceptions of entrepreneurial self-efficacy [33].

A corpus of 2636 papers was retrieved in our search strategy for the keyword "entrepreneurship education programs" during the 2007-2021 period. Fig. 2 represents the number of studies published by year during the 2007-2021 period for the keyword "entrepreneurship education programs", which indicate the increased importance of entrepreneurship education curriculum and pedagogy in recent times. The research investigating the influences of entrepreneurship education programs is still relatively inadequate [34]. Using an extensive randomised evaluation to examine an entrepreneurship training program finds no strong or lasting effects on entrepreneurship and business accomplishment [35]. A study on the impact of required entrepreneurship education programs for college students showed decreased student intention to start a business [36]. Examining participation in Stanford University's entrepreneurship program finds little impact in decreasing the difference in entrepreneurship rates based on ethnicity and nationality [37]. Researchers have examined whether university entrepreneurship programs impact entrepreneurial activity. Researchers considered two following major entrepreneurial initiatives for this study: the Stanford Center for Entrepreneurial Studies at the Business School and the Stanford Technology Ventures Program at the Engineering School. As per this study, participation in the Business School program had a negative to zero impact on entrepreneurship rates and the Engineering School program has no impact on entrepreneurship rates. Nonetheless, the Business School initiative reduces new venture failure and improves firm revenue [38]. All these findings indicate that researchers and educators need to reconsider the elements of entrepreneurship education to build effective entrepreneurship programs.

A crucial issue for entrepreneurship education is the direction of teaching [39]. To decipher that, scholars in an article in 2016 mentioned about three categories. The first one is 'business basics', which considers how the various functional business domains apply in an early-stage venture setting. The second one is 'entrepreneurship basics', where topics such as entrepreneurial process, entrepreneurial orientation, and entrepreneurial cognition are emphasised. The third area is 'entrepreneurial mindset and its associated mix of entrepreneurial competencies', where entrepreneurship educators focus on developing students' abilities in areas such as opportunity recognition, future assessment, utilising resources, and alleviating risks [40].

Scholars agreed on the fact that at least some elements of entrepreneurship can be learned, and entrepreneurs can be made [41]-[45]. However, scholars still have diverse opinions on what constitutes entrepreneurship education programs [23],[32],[46]. Several entrepreneurship scholars proposed a learning-by-creating-value approach [47] or learning-by-doing educational strategies [48] to promote entrepreneurial attributes. Few studies emphasised that entrepreneurship education programs should be about experiential learning [49]. Research studies on entrepreneurship education focus on several domains: inspiring students in learning environments to generate new businesses [50], developing students' entrepreneurial skills [51] through project-based learning [50], developing students' entrepreneurial attributes. Few studies emphasised that entrepreneurship education programs should be about experiential learning [49]. Research studies on entrepreneurship education focus on several domains: inspiring students in learning environments to generate new businesses [50], developing students' entrepreneurial skills [51] through project-based learning [50], developing students' entrepreneurial attributes. Few studies emphasised that entrepreneurship education programs should be about experiential learning [49]. Research studies on entrepreneurship education focus on several domains: inspiring students in learning environments to generate new businesses [50], developing students' entrepreneurial skills [51] through project-based learning [50], developing students' entrepreneurial attributes. Few studies emphasised that entrepreneurship education programs should be about experiential learning [49]. Research studies on entrepreneurship education focus on several domains: inspiring students in learning environments to generate new businesses [50], developing students' entrepreneurial skills [51] through project-based learning [50], developing students' entrepreneurial attributes. Few studies emphasised that entrepreneurship education programs should be about experiential learning [49].

B. Digital Learning Entrepreneurship Education Platforms

![Fig. 3 Number of papers published by year during the 2007-2021 period for the keyword "digital learning entrepreneurship education"

A research study demonstrated that individuals who attended entrepreneurship education are more likely to establish firms than those who had not received an entrepreneurship education [31]. Another comparative study on U.S. and Korea showed significant differences between entrepreneurship education programs learners and those who did not study an entrepreneurship education course. Attending the entrepreneurship education course increased the intention of venture creation [32]. Similarly, students who participated in entrepreneurship courses at the university are positively associated with increased business intentions and improved perceptions of entrepreneurial self-efficacy [33].
Fig. 3 describes the number of studies published by year during the 2007-2021 period for the keyword "digital learning entrepreneurship education". As mentioned earlier, there are 147 articles published for the keyword "digital learning entrepreneurship education" during the 2007-2021 period. Among 147 articles, 41 and 31 articles were published in 2020 and 2021, respectively, reflecting the most significant amount over the last fifteen years. This increase signifies an upsurge of interest in the use of digital learning in entrepreneurship education due to the COVID-19 pandemic. However, despite the rise, the number of articles that evaluate and analyse the importance of digital learning in entrepreneurship education is not adequate.

In the omnipresence of the internet, the digitisation of education is growing extensively, and research studies support its importance in education. Likewise, the dimensions of entrepreneurship education are also expanding [57], [58]. On the other hand, different scales of businesses increasingly adapting and utilising digitisation at diverse dimensions (from using social networks for advertisements to efficient storage, management and analysis of business data) [59].

The digital revolution has created exciting opportunities for innovating entrepreneurship education [60], [61]. Also, it provides tools to aspiring entrepreneurs to become entrepreneurially equipped [62]. Many prestigious universities, higher-education institutes and other online platforms are providing paid entrepreneurship education courses and programs. Simultaneously massive open online course (MOOC) platforms like Coursera, edX, Udacity and others are growing, providing programs on entrepreneurship education [63]. Few studies have reported the effectiveness of entrepreneurship education through innovative e-learning, improving the chances of entrepreneurial business success [6], [64], [65]. Scholars have indicated that the successful and effective incorporation of digital learning is crucial to nurturing and creating entrepreneurial competencies in the digital university-oriented entrepreneurial ecosystems [66].

Digital entrepreneurship education promotes students' engagement with entrepreneurs and combines companies' and universities' resources for research and entrepreneurial projects through technological and socio-economic diversities [67], [68]. The use of digital technologies can be crucial to developing efficient, cost-effective and adaptable solutions intended to promote entrepreneurial mindset and skills [69]. Research evidence showed that digital technologies support traditional entrepreneurship education since they enhance the communications among the factors involved in entrepreneurial ecosystem development [70]. Digital technologies can empower entrepreneurship education through the possibility of accessing an online community for developing possible business ideas [71].

Researchers acknowledge that some aspects of entrepreneurship education incorporate better with digitalisation, whereas others need more investigation, planning and careful consideration to execute effectively. Among different categories of entrepreneurship education [40], it is crucial to understand and recognise which elements seem to fit traditional ways of teaching online and for which elements may need non-traditional and innovative ways to online education. A recent research study investigating the impact of digital transformation on academic entrepreneurship elaborated and categorised the research directions on digital academic entrepreneurship in four following directions: (a) digital technologies for entrepreneurship education, (b) the maker space movement for academic entrepreneurship, (c) digital technologies for discovering entrepreneurial opportunities and (d) digital technologies for creating entrepreneurial competences in the "university based" entrepreneurial ecosystem [62].

Despite the promises, not many studies have analysed digital technologies' impact and effective implications in entrepreneurship education [69]. A study to assess the role of MOOCs on digital entrepreneurship education pointed that along with benefits, factors like lack of self-discipline to complete a MOOC and a lack of interaction with others create barriers for efficient entrepreneurship learning [72]. Furthermore, there is a lack of understanding of digital learning platforms' role in efficiently connecting universities and enterprises [73].

In this time of the COVID-19 pandemic, digital learning platforms have become more relevant [74], [75]. The COVID-19 pandemic poses a significant challenge to entrepreneurship as well as entrepreneurship education [76], [77]. To minimise the impact of COVID-19 on higher education and beyond, universities had to undertake precautionary measures and move to online teaching using digital technologies [78]. Thus, it is a crucial concern and opportunity to analyse, design and implement new entrepreneurship education processes empowered by digital technologies for reducing the gap between academia, entrepreneurs and enterprises.

C. Gamification of Entrepreneurship Education

Fig. 4 Number of papers published by year during the 2007-2021 period for the keyword "game-based entrepreneurship education"

Fig. 4 illustrates the number of studies published by year during the 2007-2021 period for the keyword "game-based entrepreneurship education". Only 58 articles were published for the keyword "game-based entrepreneurship education" during the 2007-2021 period. During the last few years, there has been increasing attention to digital game-based learning (DGBL) [79]. Interestingly, it has been more than a decade that scholars have talked about the development and impact of
serious games for entrepreneurship education [80]. However, only a handful of studies have theorised and investigated the implementation of games in entrepreneurship education. In a 2008 study, researchers developed a video game to promote learning about how entrepreneurs think under risk conditions and uncertainty and intended to substitute a case study for an in-class discussion on entrepreneurial thinking [81]. In a fascinating and rare study, researchers investigated the impact of three serious games for comparative evaluation of enterprising personality, motivation and intentions amongst engineering students registered for specialisation track in 'Entrepreneurship' of Delft University of Technology, Netherlands. This study elaborated the requirements of games for teaching entrepreneurship [82]. Several serious games are commercially available, focusing on business and entrepreneurship. One research study investigated the potential use of a commercially available business simulation digital game named "Sims 2 - Open for business" [83]. Recently, two studies have assessed the impact of gamified entrepreneurship education and emphasised the importance of investigating game effects on entrepreneurial attitudes and entrepreneurial intentions [84], [85]. Plenty of research studies support that games and gamification positively impact learning, motivation and engagement [86]-[90]. Despite the high potential of games as teaching tools to entrepreneurial attributes, there have been no relevant systemic studies to incorporate digital games in entrepreneurship education.

D. Current Challenges

With the emergence of digital entrepreneurship education, usage of social media and other tools, research studies are growing to theorise and evaluate the effectiveness of digital entrepreneurship education. However, there is a lack of research studies to assess these new dimensions of education. Combinatorial different learning approaches for entrepreneurship education needs to be considered and evaluated. Evaluating and assessing these new entrepreneurship education methods will lead to a new understanding to reduce gaps between entrepreneurial development requirements and academia.

It is an almost worldwide phenomenon that fewer women are involved in entrepreneurial ventures than men [91]. A study in 2001 concluded that women entrepreneurs have a better education than men, though men entered entrepreneurship is considerably higher than women [92]. The importance of women in entrepreneurship has grown over the past decade [93]. However, there is yet little research about the role of female educators and the impact of entrepreneurship education on females [94].

Research studies showed that Asian Americans have a significantly greater rate of entrepreneurship compared to white Americans. However, Non-American Asians have a considerably lower startup rate than Asian Americans [37]. In another study, entrepreneurship education programs in the U.S. and Korea produced very different outcomes. The impact of entrepreneurship education in Korea is much more significant than that in the U.S [32]. Only a few studies mentioned ethnicity, nationality and culture considering entrepreneurship education [95], [96].

The majority of the studies on entrepreneurship educations focus on the U.S. and some other developed economies. Research studies on the implication of entrepreneurship education in developing economies are minimal [97]. A study about India's post-graduate entrepreneurship education program showed the impact on entrepreneurship skills acquisition and new venture creation. Entrepreneurship educators need to consider modifying curriculum based on socio-economic and cultural differences [98].

In a recent article, using the Analytic Hierarchy Process (AHP), the researchers studied the perception of various perceived entrepreneurial attributes of successful entrepreneurs compared to aspiring entrepreneurs [99]. In future works, it will be interesting to know and incorporate how elements of entrepreneurship education impact different entrepreneurial skills and at diverse stages of entrepreneurship [100], [101].

Studies on entrepreneurship education predominantly consider business school curriculums. However, it is crucial to develop, implement and analyse the impact of entrepreneurship education in other domains such as engineering, medical and science education [102], [103]. Research evidence indicates the lack of empirical studies to assess and evaluate the effectiveness of entrepreneurship programmes. Entrepreneurship education programs need continuous assessment and feedback from alumni and industry.

V. CONCLUDING REMARKS

Despite exceptional progress in entrepreneurship education research in a short time, many research possibilities are still yet to be discovered. Additional research is required to develop and assess different entrepreneurship education aspects to implement in higher education effectively. This article provides several beneficial outcomes relevant to the theoretical research and implementation. To merge digital tools with traditional entrepreneurship education needs holistic theoretical considerations and frameworks. There is a need for scientific studies to measure the impact of entrepreneurship education programs and graduates' performance in entrepreneurship. Researchers need to consider various socio-economic, cultural, technological and entrepreneurial elements for future studies to find innovative teaching ways and promote critical thinking attributes for diverse economies. Entrepreneurship educators and government policymakers need to integrate cutting-edge scientific information and emerging technologies embedded in socio-economic and cultural perspectives to improve learning effectiveness and entrepreneurial intent. It will help aspiring entrepreneurs recognise their entrepreneurial ability and enhance new venture performance towards a better entrepreneurial ecosystem.

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